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DEPARTMENT OF MECHANICAL ENGINEERING (2024-2025)

LESSON PLAN (2023-2024)

Discipline: Mechanical	Semester: 3RD	Name of the Teaching faculty: MANAS KUMAR MISHRA
Subject: Engineering Material (Th-3)	No of Days/ Week class alloted: 4	Semester from Date: 01. 07 . 2024 To Date: 08. 11. 2024 No of weeks: 15

Week	Class Day	Topics
1st	1st	**CH.1 Engineering materials and their properties.**
		Lesson plan, Syllabus
		Importance of this Course, Course Outcomes
		Exams, Class Tests
	2nd	Material classification into ferrous and non ferrous category and alloys
	3rd	Material classification into ferrous and non ferrous category and alloys
	4th	Properties of Materials: Physical properties, Chemical properties.
2nd	1st	Properties of Materials: Mechanical properties.
		Performance requirements and Material reliability and safety
	2nd	**CH.2 Ferrous materials and alloys.**
	3RD	Characteristics and application of ferrous materials and classification of carbon steel.
	4th	Composition and application of low carbon steel, medium carbon steel.
3rd	1st	Classification, composition and application of high carbon steel.
	2nd	Alloy steel: Low alloy steel, high alloy steel, Tool steel
		stainless steel
	3rd	Effect of various alloying elements such as Cr, Mn, Ni, V, Mo.
		CH. 3 Iron- Carbon System.
	4th	Concept of cooling curves
4th	1st	Concept of cooling curves, phase, system, components.
	2nd	Concept of phase diagram (cu-ni system), gibbs phase rule
	3rd	Concept of phase diagram (sn-pb system)
	4th	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	1st	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	2nd	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel

5th	3rd	**CH. 4. Cyrstal Imperfections.**
		Crystal defines, classification of crystals, ideal crystal and crystal imperfections
	4th	Classification of imperfection: Point defects,line defects
6th	1st	Dislocation
	2nd	surface defects and volume defects
	3rd	Types and causes of point defects: Vacancies, Interstitials and impurities
	4th	Interstitials and impurities
7th	1st	Types and causes of line defects: Edge dislocation and screw dislocation.
	2nd	Effect of imperfection on material properties
	3rd	Deformation by slip and twinning
	4th	Effect of deformation on material properties
8th	1st	**CH. 5. Heat treatment.**
		Purpose of Heat treatment, TTT Diagram
	2nd	Process of heat treatment: Annealing
	3rd	Process of heat treatment: normalizing, hardening
	4th	Tampering, stress relieving measures
9th	1st	Tampering, stress relieving measures
	2nd	Surface hardening: Carburizing and Nitriding
	3rd	Surface hardening: Carburizing and Nitriding
	4th	Effect of heat treatment on properties of steel
10th	1st	Effect of heat treatment on properties of steel
	2nd	Hardenability of steel
	3rd	**CH. 6. Non-ferrous alloys.**
		Aluminum alloys: Composition, property and usage of Duralmin, y- alloy
	4th	Copper alloys: Composition, property and usage of Copper-Aluminum alloy.Copper-Tin alloy.
11th	1st	Copper alloys: Composition, property and usage of Copper-Tin alloy.
	2nd	Copper alloys: Babbit , Phosperous bronze, brass, Copper- Nickel alloy.
	3rd	Predominating elements of lead alloys, Zinc alloys
	4th	Predominating elements of Nickel alloys .
12th	1st	Low alloy materials like P-91, P-22 for power plants and other high temperature services.
	2nd	High alloy materials like stainless steel, variuos grades of ss.
	3rd	High alloy materials like duplex, super duplex materials etc.
	4th	**CH. 7. Bearing Material.**
		Classification, composition, properties and uses of Copper base, Tin Base bearing material.
13th	1st	Classification, composition, properties and uses of Lead base bearing materials.
	2nd	Classification, composition, properties and uses of Cadmium base bearing materials.
		CH. 8. Spring materials:

	3rd	Classification, composition, properties and uses of Iron base spring material.
	4th	Classification, composition, properties and uses of Copper base spring material
14th	1st	**CH. 9. Polymers :**
		Properties and application of thermosetting polymers.
	2nd	Polymers :Properties and application thermoplastic polymers
	3rd	properies of elastomers.
	4th	**CH. 10. Composites and Ceramics.**
		Classification, composition, properties and uses of particulate based composites.
15th	1st	Classification, composition, properties and uses of fiber reinforced composites.
	2nd	Classification and uses of ceramics.
	3rd	Previous year question discussion.
	4th	probable question/VST

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	O P Khanna	A Textbook of Material Science and Metallurgy	Dhantpat Rai
02	R K Rajput	Engineering materials and Metallurgy	S.Chand
03	S K Hazra choudhry	Material science & process	Imdian Book Distrubuting

1.07.24

Signature of Faculty (Asst. Prof.)